THESIS INFORMATION

Title:	Study on determination of some characteristic parameters of the desalination process by humidification dehumidification method
Major:	Thermal Engineering and Heat Exchangers
Major code**:**	62.52.80.01
PhD student:	Vo Kien Quoc
Advisors:	1. Prof. PhD Le Chi Hiep 2. PhD Nguyen Van Tuyen
University:	University of Technology, Vietnam National University – Ho Chi Minh City

1. Objective of the thesis:

The objective of the thesis is to determine the effect of the input parameters on the output parameters in the humidification dehumidification desalination system. Based on the studied influence, the optimum values of some characteristic parameters of the desalination process are determined.

To achieve this objective, the thesis focuses on the following specific goals:

- Evaluate the effect of the spray water temperature, the supply water temperature and the minimum temperature difference ΔT_{min} to the heat recovery rate. And then determine the optimum ratio of the mass flow rate of water to the mass flow rate of air.

- Evaluate the effect of the spray water temperature and the minimum temperature difference ΔT_{min} to the heat recovery rate and the gained output ratio GOR. And then determine the relation between the appropriate water temperature and the minimum temperature difference ΔT_{min}.

- Evaluate the effect of the air and water temperatures at the inlet of the humidifier to the air and water temperatures at the outlet of the humidifier. And then determine the appropriate Me number in the humidifier.

- Determine the relationship between the ratio of the mass flow rate of water to the mass flow rate of air, the packing bed height and the spray water temperature to the Me number of the humidifier.

- Evaluate the potential of using solar energy to heat the humidification dehumidification desalination system.

2. Contributions of the thesis:

(i) A simulation program of the heat transfer process between water and air in the humidification dehumidification desalination system was accomplished based on Pinch technology.

(ii) The equation showing the relationship between the spray water temperature & the supply water temperature and the ratio of the mass flow rate of water to the mass flow rate of air was established.

(iii) The relation of the appropriate spray water temperature to the minimum temperature difference ΔT_{min} was determined.

(iv) A simulation program of the heat and mass transfer process between spray water and air in the humidifier was developed.

(v) The equation showing the relation between the water temperature & the air temperature at the outlet of the humidifier, the optimum optimum ratio of the mass flow rate of water to the mass flow rate of air and Me number was established.

(vi) The optimal Me number in the humidifier was determined.

(vii) Maximum spray density per packing bed area unit in the humidifier was determined.

(viii) In the range from 35°C to 38°C, the air temperature at the inlet of the humidifier does not affect the Me number.

(ix) The relationship between the packing bed height, the spray water temperature, the ratio of the mass flow rate of water to the mass flow rate of air and Me number was established.

(x) A gravitational loop heat pipe solar collector was invented and successfully tested.

Advisors **PhD student**

Prof. PhD. Le Chi Hiep PhD. Nguyen Van Tuyen **Vo Kien Quoc**